

Executive Summary

Universal-free school breakfast availability was not found to improve academic outcomes beyond what was seen in elementary schools that operated the means-tested School Breakfast Program.

Background

On a typical school day the School Breakfast Program (SBP) operates in over 78,000 schools and residential child care institutions and serves over 8 million children. Fewer low-income children participate in the SBP (about 7 million) than in the National School Lunch Program (NSLP) (nearly 17 million). There is concern that low-income children might be coming to school without eating breakfast and still not be participating in the SBP for a variety of reasons, including a perceived stigma associating school breakfast participation with poverty. One approach to increasing participation in the SBP is to offer free breakfast to all students, regardless of their household income. However, such a universal-free approach to increasing breakfast participation would substantially increase the cost to the federal government. Thus it is critical to know if such expenditures are warranted. *Specifically, would the increase in SBP participation by students in elementary schools offering universal-free school breakfast result in improved dietary intakes and/or measures of academic performance?* In this context, Congress enacted Section 109 of the William F. Goodling Child Nutrition Act of 1998 (Public Law 105-336), authorizing the implementation and the evaluation of a three-year pilot in elementary schools in six school districts representing a range of economic and demographic characteristics.

The U.S. Department of Agriculture, Food and Nutrition Service conducted the three-year pilot from school year (SY) 2000–2001 through SY 2002–2003 in elementary schools in the following school districts:

- Independent School District of Boise City, Boise, Idaho
- Shelby County Board of Education, Columbiana, Alabama
- Harrison County School District, Gulfport, Mississippi
- Washington Elementary School District, Phoenix, Arizona
- Santa Rosa City Schools, Santa Rosa, California
- Wichita Public Schools, Wichita, Kansas

The aim of this pilot was to study the impact of the availability of universal-free school breakfast on breakfast participation and measures related to elementary school students' nutritional status and academic performance. *This pilot was not intended to evaluate the current SBP or the value of consuming breakfast.*

Objectives

The two main objectives of the evaluation were to: (1) Assess the effects of the availability of universal-free school breakfast on breakfast participation and selected student outcome measures including dietary intake, cognitive and social/emotional functioning, academic achievement, school attendance, tardiness, classroom behavior and discipline, food insecurity, and health; and (2) Document the methods used by schools to implement universal-free school breakfast and determine the effect of participation in this program on administrative requirements and costs.

Study Design and Methodology

An experimental design was used. Elementary schools within each of the six districts were matched and randomly assigned to implement universal-free school breakfast (treatment schools) or to continue with the regular SBP (control schools). Seventy-nine treatment and 74 control schools participated in the three-year pilot. In Spring 2001, about 4,300 students across the treatment and control schools were measured on dietary intakes, cognitive function and height and weight. Other data were also collected from parents and teachers. An analysis of these measures, data extracted from school records for School Year (SY) 1999–2000 (baseline) and SY 2000–2001 (Year 1), and information collected during interviews with school district and school staff in Spring 2001 was presented in an interim report. In SY 2001–2002 (Year 2) and SY 2002–2003 (Year 3) administrative record data including breakfast participation, attendance, tardiness, visits to the school nurse for health reasons, disciplinary incidents and academic achievement test scores were collected from schools. A second set of site visits and telephone interviews with school district and school staff was completed in Spring 2003.

The interim report “*Evaluation of the School Breakfast Program Pilot Project: Findings from the First Year of Implementation*” and the final report are available on the FNS website <http://www.fns.usda.gov/oane/MENU/Published/CNP/cnp.htm>. The final report summarizes the first year findings, presents findings from the second year and the third year of the evaluation and also examines changes over all three years of the pilot. The findings are summarized below.

Findings Across the 3 Years

Implementation of Universal-free School Breakfast

- Universal-free school breakfast can be implemented and administered in elementary schools with varying economic and demographic characteristics.
- Most stake-holders (e.g., school staff, parents, students) were generally supportive of the concept of universal-free school breakfast.

School Breakfast Participation

- The availability of universal-free school breakfast caused a substantial increase in school breakfast participation. School breakfast participation almost doubled in the treatment schools in the first year (from 19 percent at baseline to 36 percent) of universal-free school breakfast. This higher level of participation by treatment school students was maintained in the second (38 percent) and third year (36 percent) of the pilot. During this period, school breakfast participation in control schools increased slightly over baseline (from 19 percent to 21 percent).
- The impact of the pilot on school breakfast participation rates varied across the treatment schools. Greater increases were noted in treatment schools with classroom breakfast.
- School breakfast participation by paid-eligible students in treatment schools increased fourfold in the first year (from 8 percent to 31 percent). Participation by free and reduced priced eligible students in treatment schools doubled (from 25 percent to 48 percent). These higher rates were maintained in the second and third year.

Dietary Intakes (Collected in Year 1 Only)

- Students who attended universal-free school breakfast schools were more likely to consume a nutritionally substantive breakfast than students attending control schools (80 percent versus 76 percent). However, the average food and nutrient intakes of treatment and control school students at breakfast and over the course of the day was essentially the same.
- Although few students ate two or more substantive breakfasts, treatment school students (7 percent) were also more likely to do this than control school students (4 percent).

- The rate of breakfast skipping was similar and low (less than 4 percent) for treatment and control school students.
- The availability of universal-free school breakfast seems to have shifted the source of breakfast from home (or elsewhere) to school in the treatment schools.

Student Behavior—Disciplinary Incidents

- Although Year 1 findings indicated a significantly higher rate of disciplinary incidents in treatment schools as compared to control schools, there was no difference in the total number of daily incidents in Year 2 or Year 3.

Academic Achievement Test Scores, Attendance and Tardiness

- There was no clear indication that the pilot had any impact on gains in academic achievement test scores (reading and math) in any of the three years.
- There was no impact of the availability of universal-free school breakfast on the rates of attendance or tardiness in Years 1, 2 or 3.

Student Health—Visits to the School Nurse

- In Year 2, control school students had a significantly higher rate of daily visits to the school nurse than treatment school students (4.0 versus 3.3). However, in Year 3, as in Year 1, there was no significant difference in the number of daily visits to the school nurse between students in control and treatment schools.

Additional analyses were conducted on the data that were collected from students in Year 1 to further explore the relationship between breakfast consumption and student outcomes. Findings are presented in the final report.

Conclusion

The availability of universal-free school breakfast significantly increased school breakfast participation but had little impact on other outcomes measured over the course of the evaluation including academic achievement test scores, attendance, tardiness, health, and discipline. Although treatment school students were more likely to consume a nutritionally substantive breakfast than control school students, there was almost no difference in average food and nutrient intakes at breakfast or over the course of the day. It should be noted that these findings do not negate the importance of eating breakfast. What these findings suggest is that simply offering free school breakfast to all elementary school students would not, on average, be expected to improve academic or behavior outcomes beyond what occurs in schools already offering the SBP.

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Summary of Findings

The William F. Goodling Child Nutrition Act of 1998 (Public Law 105-336, section 109) authorized the School Breakfast Program Pilot Project (SBPP) to study the implementation and effects of providing universal-free school breakfast to elementary school students in six school districts across the United States. The six school districts chosen for the pilot were:

- Boise, Idaho: Independent School District of Boise City;
- Columbiana, Alabama: Shelby County Board of Education;
- Gulfport, Mississippi: Harrison County School District;
- Phoenix, Arizona: Washington Elementary School District;
- Santa Rosa, California: Santa Rosa City Schools; and
- Wichita, Kansas: Wichita Public Schools.

For three years, from School Year (SY) 2000–2001 through SY 2002–2003, these six school districts were provided federal funds to offer school breakfasts free of charge, regardless of family income. The schools in these districts were first matched on a number of characteristics, and then randomly assigned to either treatment or control status. The treatment schools offered universal-free school breakfast, and the control schools continued to offer the regular School Breakfast Program (SBP), providing free or reduced-price breakfasts to eligible students from low-income families. Over the course of the three years of the pilot project, data were collected from all participating schools for an evaluation of the implementation and impact of providing universal-free school breakfast. In Fall 2002, the Food and Nutrition Service (FNS) released an interim report of the findings describing the first year of the pilot project. That report, entitled *Evaluation of the School Breakfast Program Pilot Project: Findings from the First Year of Implementation*, is available on the FNS website (<http://www.fns.usda.gov/oane/MENU/Published/CNP/cnp.htm>).

This document summarizes the final report of findings from the SBPP, entitled *Evaluation of the*

School Breakfast Program Pilot Project: Final Report. There are four parts to this summary. First, the main findings of the evaluation are summarized by the four study objectives over the three years of the pilot. Second, background information is provided to put these findings in context. Third, results of the second and third years of the SBPP are highlighted separately for the evaluation of implementation and impacts. Fourth, results of supplementary analyses conducted in response to questions by policy makers and key stakeholders are summarized.

Overall Evaluation Findings

OBJECTIVE 1

Document the various ways in which schools choose to implement universal-free school breakfast.

The SBPP provided the six school districts in this evaluation a great amount of autonomy over how they implemented universal-free school breakfast in their treatment schools, and indeed each district tailored the pilot program to its local context. The decision to apply to be a part of the SBPP was made at the district level, but once the districts were chosen, most of the key program decisions, including the location, timing, duration, staffing and supervision of breakfast, were made at the school level.

In general, SBPP implementation went smoothly. For the most part, schools were able to get the pilot up and running in a matter of weeks, despite the short interval between the selection of school districts and the start of school. Some schools implementing universal-free school breakfast had to adopt new procedures for delivering and serving food, collecting trash, and keeping records. In general, however, these issues did not cause major problems for SBPP implementation.

Determining whether breakfast would or would not be eaten in the classroom turned out to be a key decision, as participation was much higher for

students with the classroom breakfast option. Of the 79 treatment schools, 14 served breakfasts that were eaten in the classroom in Year 3 of the SBPP, down from 18 in Year 1. Breakfast was consistently eaten in the classroom over the three pilot years in 12 of the treatment schools.

Classroom breakfast seemed to pose some particular challenges requiring extra effort by school staff, including teachers and custodians. School administrators appear to have been conflicted by the attraction of achieving increased rates of school breakfast participation by offering free breakfast in the classroom, and the drawbacks of adding to the workload of staff (e.g., teachers and custodians). Though based on a small sample, teachers who had not experienced breakfast in the classroom were generally opposed to the idea, while teachers who had had breakfast in the classroom were much more supportive. Of note is that while a primary concern anticipated for classroom implementation was loss of teacher preparation time or instruction time, first year (Spring 2001) interviews with teachers in schools with classroom breakfast reported little or no effect.

Administrators, school staff, parents, and students were generally pleased with universal-free school breakfast. When interviewed near the end of the pilot in Spring 2003, principals said that the experience with universal-free school breakfast had been positive or very positive. Although administrators had anticipated that some parents might have negative reactions to the pilot because they believe students should be getting breakfast from home, or that control school students should also receive free breakfasts, this never occurred.

OBJECTIVE 2

Assess the effect that universal-free school breakfast has on paperwork, costs, and other administrative requirements.

There was little evidence that the implementation of universal-free school breakfast had any impact on administrative paperwork. The majority of SFA directors, cafeteria workers, and principals reported no effects on paperwork or administrative reporting. Treatment school principals were asked if the SBPP had an effect on the accuracy or integrity of record keeping. Eighty-seven percent responded that they did not believe it had an effect. A little over a third of the 14 principals in schools with classroom breakfast thought that it had affected accuracy or integrity of record keeping, but they were split on whether it improved or diminished accuracy.

Furthermore, there was no evidence from the review of breakfast menus at the end of Year 1 that the implementation of universal-free school breakfast had an effect on schools' compliance with the SBP nutrition standards or the degree to which the breakfasts served to students met other dietary recommendations.

Cost data gathered for the first year of SBPP implementation showed that the treatment schools fared materially better than the control schools.¹ The analysis of costs found that increased participation led to lower per-meal labor costs in treatment schools. The combined food and labor costs per breakfast were about 11 percent lower in treatment than in control schools. This per-meal cost was 18 percent lower than control schools for treatment schools with classroom breakfast. Overall, treatment schools, reimbursed at the free meal rate for all breakfasts served, had revenues about 40 percent higher than food and labor costs. Control schools, which continued to be reimbursed based on participants' school meal eligibility, had revenues that were about 28 percent higher than these costs.²

1 In the Spring 2003 data collection, Implementation Study interviews included questions on cost, but actual cost data were collected only in Spring 2001.

2 While food and labor costs make up the major share of breakfast costs, other costs, such as supplies, contract services, depreciation, and indirect charges by the school district, also would affect this estimate. In addition, other minimal sources of revenue, such as à la carte sales, were not included. A prior, nationally representative study of meal costs (Glantz et al., 1994) found that costs other than food and labor added about 12 percent to reported costs in SY 1992–1993. Adding these additional costs, assuming their relative size has not changed, slightly narrows the financial advantage enjoyed by treatment schools taking part in the SBPP. In the earlier study, food and labor costs exceeded the SY 1992–1993 reimbursement rate for free breakfasts.

Treatment schools also experienced an increased workload and some need for additional staff. The workload of cafeteria staff increased and additional assistance was needed to supervise the increased number of breakfast participants. However, these increases stabilized during the second and third years of the pilot.

OBJECTIVE 3

Assess the effects of universal-free school breakfast on student participation.

School breakfast participation rose significantly³ in the first year of the SBPP, increasing by about 16 percentage points for treatment school students over and above the 1 percentage point increase realized for control school students. Participation remained stable for both groups over the second and third years of the pilot, with no significant changes in the control group or treatment group over this period.

The gain in school breakfast participation differed by school meal eligibility status. Relative to baseline participation, paid-eligible students in the treatment schools showed a significantly greater jump in participation (21 and 25 percentage point increases respectively for Years 1 and 2) compared to their control counterparts than free or reduced-price students (15 percentage point increase in Years 1 and 2). Differences in participation increases by school meal eligibility status from baseline to Year 3, however, were not statistically significant (a net increase of 21 percentage points for paid-eligible compared with a net increase of 14 percentage points for free or reduced-price eligible).

Results from the first year indicated considerable variation in the participation increase experienced in each district. This ranged from 7 percentage points in one district to 34 percentage points in the district where school breakfast in treatment schools was eaten in the classroom. Similar to the reported findings in Year 1, implementation of universal-free school breakfast led to significant district-level increases in participation in treatment schools in both Years 2 and 3. Over both years, each district also showed net increases in treatment school

breakfast participation relative to the baseline year, ranging from about 11 percentage points in Years 2 and 3 to 30 percentage points in Year 2 for schools in the district with classroom breakfast.

OBJECTIVE 4

Assess the effects of universal-free school breakfast on student outcomes.

Over the three years of the SBPP, the results revealed no consistent pattern of positive effects on student outcomes associated with the availability of universal-free school breakfast. An important first step in looking at differences was to look at breakfast consumption and food and nutrient intake at breakfast and over 24 hours, since the consumption of a nutritious breakfast serves as a potential pathway for all other short- and long-term outcomes. Data collection at the end of the first year found that the rate of skipping breakfast altogether was low overall—less than 4 percent for students in both treatment and control schools. The likelihood of consuming a substantive breakfast, defined as food from at least two food groups and more than 10 percent of the 1989 Recommended Dietary Allowance (RDA) for food energy, was higher among students attending treatment schools (80 percent) than those attending control schools (76 percent).

One potential but unintended effect of universal-free school breakfast is that some children could consume more than one breakfast in a given day, one at home and one at school. This study does not dispel that notion. Using the same definition of a substantive breakfast as above, treatment school students were more likely to consume more than one substantive breakfast than their controls, by a difference of 3 percentage points. However, the incidence of consumption of more than one nutritionally substantive breakfast for both groups was low (7 percent for treatment school students, 4 percent for controls). Nonetheless, students who consumed the additional breakfasts had higher food energy intakes than those who only ate one breakfast at both breakfast (40 percent versus 20 percent of the RDA) and over a 24-hour period (122 percent versus 101 percent of the RDA).

3 Throughout this summary, “significant” refers to any statistically significant difference with $p < .05$.

Almost all (93 to 100 percent) students in both treatment and control schools had 24-hour dietary intakes that were adequate for vitamins and minerals, based on Dietary Reference Intakes (DRIs), and that exceeded 80 percent of the 1989 RDA for food energy and protein.⁴ On the other hand, few students in either group met the *Dietary Guidelines* recommendations for total fat, saturated fat, or sodium.⁵ The availability of universal-free school breakfast was thus not related to students' likelihood of meeting daily dietary requirements and other recommendations.

No pattern of significant results was found after the first year for the full array of other student outcomes, including cognitive and social/emotional functioning, food insecurity, body mass index, health status, attendance, tardiness, academic achievement, and incidence of school nurse visits. There were only scattered statistically significant differences between treatment and control school students on these measures.

Record data continued to be collected in Years 2 and 3 on academic achievement, attendance, tardiness, and incidence of disciplinary visits to the principal and visits to the school nurse. Again, no clear pattern of differences was found in these subsequent data collections. One significant result for the first year of the SBPP was the higher number of daily disciplinary incidents requiring a trip to the principal's office for treatment school students when compared to controls. The incidence was significantly higher in the morning. However, the overall difference in disciplinary incidents was not significant in either the second or third year of the SBPP. In Year 2, there was a significant effect in the afternoon. There was no effect for time of day in Year 3.

Conclusion

The results of this evaluation suggest that universal-free school breakfast can be fairly easily implemented and administered in elementary

school settings that vary in terms of geographic region, racial/ethnic mix, and students' household income. Key stakeholders, including administrators at the school district and school levels, school staff, parents, and students were generally supportive of the concept of universal-free school breakfast. The availability of classroom breakfast was linked to the greatest increases in student participation, but barriers continued to exist to more widespread implementation of breakfast in the classroom. Most notably, the increased workload for staff and the opposition of teachers were expressed as deterrents. At the same time, however, the first year of data collection showed that the majority of teachers in schools with classroom breakfast had a positive experience, while those who had not experienced classroom breakfast were opposed to the idea. In a recent report on Minnesota's Fast Break to Learning Initiative, researchers reported that participation rates were highest when there was a school-wide policy about breakfast that included teacher input, such as entire classes going to the cafeteria together to get breakfast (Peterson et al., 2003).

The findings on SBPP impacts on students suggest that when compared to students in elementary schools offering the regular SBP, there are few benefits of offering universal-free school breakfast. Participation increased significantly in the first year of the SBPP and this was sustained in the subsequent two years. There was also a greater likelihood of consuming a nutritionally substantive breakfast for students in the treatment schools.

On the wide array of other outcomes measured over the course of the evaluation, there were no noteworthy impacts on students, either positive or negative. These included short-term outcomes measured on the same day as a child was offered the opportunity to eat school breakfast, including cognitive functioning in the period after breakfast and dietary intake over the course of the day, and more long-term outcomes, including performance on standardized achievement tests.

4 To assess dietary adequacy for groups, the Institute of Medicine (IOM) recommends assessing the prevalence of *inadequate* nutrient intakes (IOM, 2000) by comparing usual intakes with the Estimated Average Requirement (EAR). For this study, 0 to 7 percent of students overall had inadequate intakes of micronutrients. Since EARs for food energy, protein, and calcium were not available at the time of these analyses, average requirements were estimated for purposes of group comparison as 80 percent of the 1989 RDA (National Research Council, 1989).

5 See the final report (Bernstein et al., 2004) for a complete list of references for the dietary standards and other assessments and measures.

These findings do not negate the importance of breakfast. There is an entire body of literature that suggests there are positive nutrition and cognitive benefits to eating breakfast. Nor do they negate the significance of the SBP, which provides an important meal to students who might not eat otherwise. What they do suggest is that simply offering school breakfast to all elementary school students free of charge should not, on average, be expected to improve academic or behavior outcomes beyond what occurs in schools already offering the SBP.

The School Breakfast Program

The SBP is currently available in approximately 78,000 schools and institutions and serves about 8.2 million students each day (Food and Nutrition Service, 2004a). The U.S. Department of Agriculture's Food and Nutrition Service (FNS), which administers the SBP, provides cash subsidies for school breakfasts served to children at all income levels. Eligible institutions include public schools, private non-profit schools, and public or non-profit private licensed residential childcare institutions. Schools and institutions that participate in the SBP must serve breakfasts that meet federal nutrition standards and must provide free and reduced-price meals for those who are determined eligible. Children from households with income at or below 130 percent of the federal poverty level are eligible to receive breakfast at no charge (free-eligible); those from households with income between 131 and 185 percent of the poverty level pay no more than 30 cents for breakfast (reduced-price eligible); and children from households with income above 185 percent of the poverty level must pay the price established by the SFA for a school breakfast (paid-eligible). In SY 2002–2003, the last year of the SBPP, the maximum free-eligible income for a family of four was \$23,530; the maximum reduced-price eligible income for a family of four was \$33,485.

USDA provides cash reimbursements to school districts that meet the requirements of the SBP. For SY 2002–2003, the reimbursement per breakfast

served was as follows: \$1.17 for free; \$0.87 for reduced-price; and \$0.22 for paid breakfasts. These reimbursements are higher in areas designated as "severe need" (\$0.23 higher per breakfast served for free and reduced-price breakfasts) and in Alaska and Hawaii. In SY 2002–2003, 79 percent of all SBP meals nationwide were served free or reduced-price (FNS, 2004a). According to FNS (2004a), about 65 percent of the breakfasts served in the SBP are reimbursed at the severe-need rate. In fiscal year 2003, Congress appropriated \$1.68 billion for the SBP.

Schools that participate in the SBP must serve breakfasts that are consistent with the federal *Dietary Guidelines for Americans* limitation of total fat to 30 percent or less of calories and saturated fat to less than 10 percent of calories (U.S. Departments of Agriculture and Health and Human Services, 2000). In addition, school breakfasts must provide, on average over the course of each school week, at least 25 percent of the 1989 RDA for food energy (calories), protein, iron, calcium, and vitamins A and C for age/grade-specific categories.

While the SBP has grown considerably since its inception, participation in SBP has continued to lag behind its counterpart, the National School Lunch Program (NSLP), which currently operates in approximately 100,000 schools and institutions, and serves over 26 million students each day (FNS, 2004b). Recent reports suggest that many who are eligible for free and reduced-price breakfasts are not taking advantage of them. In a recent analysis, the Food Research and Action Center (2003) compared participation in the SBP and NSLP. The authors report that nationally only about 42 students receive a free or reduced-price breakfast for every 100 receiving a free or reduced-price lunch. Rossi (1998) analyzed data collected in 1992 from the first School Nutrition Dietary Assessment Study (SNDA-I) and concluded that only 29 percent of the children eligible for free and reduced-price breakfasts were actually eating them. One aim of the SBPP was to determine if providing school breakfast free of charge to all students would help address the underutilization of the program by low-income families.

The School Breakfast Program Pilot Project

The William F. Goodling Child Nutrition Act of 1998 (Public Law 105-336, section 109) authorized the Secretary of Agriculture, through FNS, to conduct a pilot study that provided free school breakfasts to all students regardless of family income. The SBPP demonstration that resulted was a three-year commitment by the six school districts that were selected for the program. Half of the participating elementary schools in each district continued to provide the regular SBP (control schools), while the other half offered universal-free school breakfast (treatment schools). FNS, through State Child Nutrition Agencies, reimbursed the districts for all breakfasts served to students in the treatment schools at the federal reimbursement rate for free breakfast. School districts were given wide latitude to implement the SBPP in a way that best suited their local context. Thus, while the federal nutrition standards for breakfast had to be maintained, the districts and/or treatment schools determined what was served, how it was served to students (e.g., brown bags picked up in the cafeteria, buffet style), and when and where breakfast was served and eaten. The school districts were required to maintain the integrity of the school assignment to either treatment or control status over the course of the three-year project.

Evaluation of the School Breakfast Pilot Project

The legislation authorizing the SBPP required that the evaluation address the following objectives:

1. Document the methods used by schools to implement universal-free school breakfast;
2. Assess the effect that universal-free school breakfast has on paperwork, costs, and other administrative requirements placed on schools;
3. Assess the effects of universal-free school breakfast on student participation; and

4. Assess the effects of universal-free school breakfast on student outcomes, including dietary intake, school attendance and tardiness, classroom behavior and discipline, and academic achievement.⁶

The Implementation and Impact Studies of this evaluation were designed to address Objectives 1 and 2, and Objectives 3 and 4, respectively. An experimental design with random assignment was chosen as the most scientifically rigorous approach to addressing the objectives of this evaluation. Seventy-nine elementary schools participating in the evaluation were randomly assigned to provide universal-free school breakfast (treatment), and 74 elementary schools were randomly assigned to continue with the regular SBP (control).⁷

In Spring 2001, toward the end of the first year of the SBPP (SY 2000–2001), site visits were made to each of the six school districts and telephone interviews were completed with key stakeholders in the pilot, including district administrators, School Food Authority (SFA) directors, principals, cafeteria managers, teachers, and custodians. Student focus groups were also held in each district. In Spring 2001, about 4,300 students across the treatment and control schools were measured on dietary intake, cognitive function, and height and weight. Data were also collected from parents, teachers, and school records, including those on student health status, behavior and discipline, social/emotional functioning, school breakfast participation, academic achievement, and school attendance and tardiness. The results of the first year of data collection for Implementation and Impact Studies are reported in McLaughlin et al. (2002).

In subsequent years of the SBPP, SY 2001–2002 and SY 2002–2003, data were collected on the original sample of students and schools from school records only. These data included school breakfast participation, academic achievement, school attendance and tardiness, and incidents of visits to the school nurse for health reasons and to the principal for disciplinary reasons. A

⁶ The legislation combines the first two and second two objectives. They are separated here in order to parallel the structure of the discussion of the results in the report.

⁷ In some districts, schools with different grade configurations (e.g., K-2, 3-5) were combined to form one school unit for sampling. In addition, in three school districts, two treatment school units were paired with one control group unit. Thus, there were a total of 79 schools in the treatment group and 74 in the control group. In one district, some grades in one control school were reassigned to a newly constructed school, which was added to the study, bringing the total number of schools to 154 by Year 3.

Exhibit 1 **Selected Characteristics of Elementary Schools Participating in the School Breakfast Pilot Project, by District**

Characteristic	Boise	Shelby County ¹	Harrison County	Phoenix	Santa Rosa	Wichita
Number of Schools in the Evaluation						
Treatment	17	8	5	12	5	32
Control	17	9	5	12	5	27
Total	34	17	10	24	10	59
Total Enrollment						
SY 1999–2000	14,362	9,739	7,899	15,586	4,364	24,508
SY 2002–2003	13,556	10,341	6,981	16,963	3,938	23,627
Percent Change	-6%	6%	-12%	9%	-10%	-4%
Percent of Elementary School Students Approved for Free and Reduced-Price Meals²						
SY 1999–2000	32%	24%	62%	48%	70%	59%
SY 2002–2003	37%	26%	60%	49%	60%	61%
Range in Free and Reduced-Price Eligibility Among Elementary Schools in the District, SY 2002–2003	5–80%	6–65%	33–80%	13–86%	16–86%	22–92%
SBP Participation Rate²						
SY 1999–2000	9%	21%	33%	21%	25%	24%
SY 2002–2003	16%	32%	49%	29%	35%	31%
District Area (square miles)						
	46	795	581	44	34	136

1 Two schools were new and did not have data in school district files for SY 1999–2000. At the start of SY 2001–2002, a control school split into two separate schools.

2 Percent is weighted for enrollment in each school.

Sources: Impact Study—School District Files, SY 1999–2000; U.S. Census Bureau: County and City Data Book, 1990, and State and County Quick Facts, 2000 (district area data).

second set of site visits and telephone interviews with stakeholders were completed in Spring 2003. Respondents for this set of interviews included school district administrators, SFA directors, principals, and cafeteria managers. The results of these subsequent data collection efforts are the focus of the final report (Bernstein et al., 2004) and are summarized below.

Implementation Study Findings

Findings reported include selected characteristics of the participating school districts, how the SBPP was implemented, and the impact of the SBPP implementation on school districts and schools.

Characteristics of the School Districts

Exhibit 1 provides a brief summary of selected characteristics of the six participating school districts.

Implementing the Universal-Free School Breakfast Program

The focus of this section is on the implementation of universal-free school breakfast in the second and third years of the pilot, and specifically on program promotion, the breakfast setting, cafeteria operations, and the composition of breakfast menus.

Program Promotion in Implementation Years 2 and 3

Three of the six SFA directors reported that they had promoted universal-free school breakfast during the last two years of the pilot. Most principals also reported an increase in promotional activities during this time. During the first year, SY 2000–2001, 44 percent of treatment school principals and 12 percent of control school principals said that they had made a special effort to promote the SBP. The comparable shares during the last two years were 76 percent of treatment school principals and 47 percent of control school principals, representing a significant difference. The increased promotion efforts occurred in all six districts.

Breakfast Setting

Most schools participating in the pilot provided breakfast in the same setting throughout the study period. Of the 154 cafeteria managers responding to the survey administered in the final year, 142 (92 percent) said that they had provided breakfast in the same location for the entire three-year period. One approach that appealed to some treatment schools was to permit students to eat breakfast in the classroom. This approach had been used in earlier demonstrations of universal-free school breakfast and had been found to result in substantially higher rates of participation in the breakfast program (Murphy and Pagano, 2001). During the initial year of the SBPP, of the 79 treatment schools, 18 schools offered their students an opportunity to eat school breakfast in the classroom.

Of the eighteen schools with classroom breakfast, five went to cafeteria breakfast, two at the beginning of the second year and three at the beginning of the third year. One school adopted classroom feeding the first year, returned to the cafeteria the second year, and back to classroom feeding the third year. Another school gradually added classroom breakfast, thereby shifting from cafeteria to a combination classroom/cafeteria status by the end of the pilot. The net effect of these changes was that the number of schools where breakfast was eaten in the classroom fell somewhat from 18 to 14 (from 23 percent to 18 percent of treatment schools) over the three years of the study.

Cafeteria Operations

Offer versus Serve at Breakfast. To avoid unnecessary waste, schools may allow students to refuse a limited number of foods offered from among those required to qualify as a reimbursable meal. The approach is called “offer versus serve” and is implemented in elementary schools at the discretion of the SFA. In SY 2002–2003, about half (51 percent) of the schools in the pilot (treatment and control) were following the offer versus serve approach. This was down from 75 percent in SY 2000–2001. The decline in the use of offer versus serve is due mostly to its discontinued use in one of the larger school districts.

The share of control schools implementing offer versus serve fell from 82 percent in SY 2000–2001 to 53 percent in SY 2002–2003. Treatment schools where breakfast was eaten in the cafeteria decreased in their implementation of offer versus serve from 79 percent of schools in SY 2000–2001 to 50 percent in SY 2002–2003. Treatment schools where breakfast was eaten in the classroom, however, actually increased their implementation of offer versus serve from 33 percent in SY 2000–2001 to 43 percent in SY 2002–2003, as more of these schools were able to provide this option.

Availability of à la Carte Items at Breakfast. Some schools also offer their students an opportunity to buy individual food items à la carte, either in addition to or instead of a reimbursable breakfast. In SY 2000–2001, the first year of the pilot, 41 percent of all schools offered breakfast items à la carte. The share of treatment schools offering à la carte in the first year was significantly lower than the share of control schools (33 percent versus 50 percent), due primarily to the absence of à la carte offerings by treatment schools with classroom breakfast.

Results of the SY 2002–2003 survey indicate that the share of control schools offering à la carte had been cut nearly in half, falling from 50 percent to 27 percent. There was no longer a statistically significant difference between control and treatment schools in whether they offered à la carte at breakfast.

Accessibility of Breakfast. The median length of time allotted for breakfast service in SY 2002–2003 was 30 minutes in both control and treatment schools, representing the same amount of time as in SY 2000–2001. Eleven percent of schools treated breakfast as part of their school day. In the 89 percent of schools where breakfast was not treated as part of the school day, cafeteria managers were asked for their opinion on how much initiative was required by students to eat a school breakfast. In the first year of the pilot, one quarter (26 percent) of all cafeteria managers reported that “moderate” to “significant” initiative was required in their schools. In contrast, over two-thirds of cafeteria managers (69 percent) said that “little” or “no” initiative was required. No significant differences were found, however, between control and treatment schools. In

SY 2002–2003, the share of all cafeteria managers responding that “moderate” to “significant” initiative was required was only about half as large (14 percent) as in the first year, again with no difference between treatment and controls.

Breakfast Composition. Cafeteria managers were asked if there had been any changes in the types and amounts of foods in the breakfasts served during the second and third years of the pilot, and, if there had been changes, to describe them and their impact. Across all schools, only 14 percent of all respondents indicated that there had been a change in the composition of breakfast over this period, with no significant difference between control and treatment. Of the relatively small share of cafeteria managers who indicated that there had been a change in the composition of breakfast in their school, one-third (32 percent) said that it had been occasioned by the increased use of prepared foods resulting in a decline in preparation time. Half of those reporting a change in composition said that the change had the effect of increasing the variety of foods offered.

The Impact of Implementing the SBPP on School Operations and Costs

Eating Breakfast in the Classroom

Of the relatively few decisions that had to be made in implementing universal-free school breakfast, deciding where breakfast was to be eaten was potentially one of the most important for two reasons. First, the rate of participation in treatment schools where breakfast was eaten in the classroom was significantly higher than the rate in treatment schools where breakfast was eaten in the cafeteria. Second, allowing students to eat breakfast in the classroom affected the workload of cafeteria, teaching, and custodial staff. To the extent that principals gave further attention to the issue in the second and third years of the pilot, they appear to have been conflicted by the attraction of achieving increased participation and the drawbacks of adding to staff workload. The opposition of some teachers to classroom breakfast appears to have influenced the decisions of some principals on breakfast location.

There were practical issues to address in implementing classroom breakfast as well. Four of

the six SFA directors said that treatment schools had encountered problems with the implementation of universal-free school breakfast in the classroom. There were scattered problems associated with insect infestations, spillage, refuse collection, meal accountability, teacher resistance, and the difficulty of procuring breakfast foods in forms conducive to being eaten in the classroom setting. The cafeteria managers in 9 of the 14 schools where breakfast was eaten in the classroom said that they had experienced a variety of problems in serving breakfast in the classroom, including spillage, poor record keeping, teacher resistance, difficulties in delivering food to the classrooms, and increased plate waste.

Administrative Requirements

One objective of the evaluation that was expressly noted in the legislation authorizing the pilot project was to assess the impact of universal-free school breakfast on “the paperwork required to be completed by the schools” (Public Law 105-336, section 109). To the extent that offering universal-free school breakfast resulted in an increased administrative burden, treatment school principals were probably in the best position to have observed it. School paperwork, including that associated with administering school food programs, is commonly managed by the “front office” under the supervision of the principal or the principal’s designee. Principals in treatment schools were therefore asked if they thought the pilot had any effect on paperwork or administrative requirements and if it had increased, to estimate what share of the increase was associated with the evaluation and what share with implementation.

Of the principals interviewed, over two-thirds (71) percent felt that offering universal-free school breakfast had no effect on administrative requirements. Of the remaining 29 percent, most believed that the pilot had resulted in increased administrative requirements and that more than half of the increased paperwork was associated with evaluation activities rather than implementation. Thus, while a majority of all respondents observed no change in administrative workload as a result of universal-free school breakfast, a minority (27 percent) felt that there had been an increase in workload, some of which was associated with implementation.

Treatment school principals were asked if they thought that the SBPP had any effect on the accuracy or integrity of school breakfast record keeping. While 87 percent of all treatment school principals said that offering universal-free school breakfast had not affected the accuracy of record keeping, principals of schools serving breakfast in the classroom were more divided in their responses. Of these principals, 5 of 14 (36 percent) said that they thought it had affected accuracy, but were split on whether it had a positive or negative impact.

Impacts on Staffing and Workload of Non-instructional Staff

One of the more widespread impacts observed in the initial year of the pilot was the increased use of foodservice labor in treatment schools. The increase in staff workload was directly associated with the increased number of breakfasts that were being served. To handle the increased number of students, many schools either increased the number of hours worked by existing staff, added additional staff, or did some combination of the two. Findings from the first year study also indicated that the number of breakfasts increased proportionately more than did the number of staff hours, reflecting an improvement in labor efficiency when operating on a larger scale.

When principals were asked about the trend in staffing for breakfast service in their schools in the second and third years of the pilot, most said there had been “no change,” with no significant difference between the responses of control and treatment school principals. Cafeteria managers expressed a similar view.

Among those schools where breakfast had been eaten in the classroom, over two-thirds (70 percent or more) of the principals interviewed said that both cafeteria workers and custodians had been affected by the SBPP. In the case of custodians, there was no consensus on whether the net impact had been positive (reported by 24 percent of principals) or negative (reported by 22 percent of principals). With regard to cafeteria workers, a substantially larger share perceived the impact to have been positive rather than negative (42 percent versus 10 percent).

Impact on Costs and Revenues

As part of the evaluation conducted during the first year of the SBPP, estimates were made of food and labor costs, and revenue from meal reimbursements and paid meals for each school taking part in the study. In brief, the results indicated that the higher rates of participation in the treatment schools made it possible for them to achieve substantial economies in their use of cafeteria labor. As a result, the average labor cost per breakfast in treatment schools was only 71 percent of the average cost in control schools. This advantage, combined with reimbursement at the highest rate for all breakfasts served in treatment schools, worked to the financial benefit of these schools.

Detailed cost and revenue data were not collected for the second and third years of the pilot. Instead, SFA directors and school principals were asked for their perceptions of the effect of universal-free school breakfast on costs and revenues over this period. Of the four SFA directors who had observed the pilot from beginning to end, all agreed that the additional revenues associated with universal-free school breakfast exceeded any additional costs incurred during the second and third years of the pilot.

Plate Waste

As part of the first year evaluation, cafeteria managers were asked for their perceptions of any changes in the relative magnitude of plate waste during the first year of the pilot, compared to the previous year (McLaughlin et al., 2002). While a majority of all cafeteria managers said that there had been no change, the share of control school cafeteria managers indicating no change was significantly higher than the share of treatment school cafeteria managers (87 percent versus 67 percent). For treatment schools with classroom breakfast, the share of cafeteria managers reporting increased plate waste was nearly twice as high as for that for non-classroom breakfast treatment schools (28 percent versus 15 percent).

When asked in SY 2002–2003, a majority (62 percent) of cafeteria managers responded that the amount of plate waste had not changed over the previous two years of the SBPP, with no significant

Exhibit 2 Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on Key Stakeholders, SY 2002–2003



N = 79

Source: Implementation Study—Principal Interview, Spring 2003

difference between control and treatment schools. As in the first year, the share of cafeteria managers reporting increased plate waste was small but substantially higher among treatment schools (10 percent versus 1 percent in control schools) and within that group, higher among classroom breakfast schools than non-classroom breakfast schools (14 percent versus 9 percent).

All of the treatment schools that reported a decline in plate waste in SY 2002–2003 were non-classroom breakfast schools. The most frequently mentioned reason for the decline in plate waste was the improved acceptance of the breakfasts by students, helped by the adoption of new menu items.

Stakeholder Perceptions and Attitudes

The results of the 2001 interviews, presented in the report of the first year findings (McLaughlin et al., 2002), revealed a positive attitude toward the SBP in general, and universal-free school breakfast in particular, across all stakeholders. These stakeholders included district and school administrators responsible for integrating the feeding programs with the educational mission of their institutions, foodservice personnel at both district and school levels, teachers, custodians, parents, and, students. Follow-up interviews in 2003

generally found similar perceptions of the SBP and universal-free school breakfast.

Treatment school principals were also asked to assess the impact of their school's participation in the pilot on key stakeholders using a five-point ranking from very positive to very negative. The results are summarized in Exhibit 2. Students were seen to have benefited most, with 90 percent of the principals indicating that the impact was positive or very positive. In schools where breakfast was eaten in the classroom, every principal (100 percent) viewed the impact on students as positive or very positive. Nearly two-thirds (65 percent) of the principals judged the impact on teachers as positive or very positive, while only 5 percent perceived a negative impact (nearly all in classroom breakfast schools). In the view of principals, the pilot had a less positive impact on cafeteria workers and custodians. This was particularly evident in schools where breakfast was eaten in the classroom. Twenty-nine percent of the principals described the impact on cafeteria workers as negative or very negative, and 43 percent had the same assessment of the impact on custodians. For treatment schools where breakfast was not eaten in the classroom, 6 percent of principals reported a negative impact on cafeteria workers and 17 percent reported a negative impact on custodians.

Post-SBPP Plans

At the time of the SY 2002–2003 interviews, the SBPP was nearing its June 30, 2003 termination. At that time, treatment schools in the participating school districts were expected to revert to their former status as participants in the SBP and to the standard schedule of meal reimbursement.

School principals and cafeteria managers in treatment schools were asked if they had any concerns about returning to the regular SBP when the pilot ended at the end of the school year. About two-thirds of both the principals and the cafeteria managers responded affirmatively. In schools where breakfast was eaten in the classroom, 93 percent of the cafeteria managers voiced concerns over returning to the traditional SBP. The reasons cited with greatest frequency among cafeteria managers were: decreased program participation (37 percent), a concern that some students would go hungry (28 percent), and the likelihood of student/parental confusion over the need to pay (20 percent). The most prominent concerns among treatment school principals were that some students would no longer eat school breakfast (51 percent), in part because they could not afford it, and that participation in the SBP would fall (18 percent).

Impact Study Findings

This section presents results from the analyses conducted to assess the impact of the availability of universal-free school breakfast on student outcomes in Years 2 and 3 of SBPP implementation. These analyses utilize the rigor of the experimental design in addressing the main question concerning program impact: Do students in elementary schools where universal-free school breakfast is available do better on a number of key outcomes relative to students participating in the regular SBP? The results are discussed by outcome measure.

School Breakfast Participation

Changes in school breakfast participation were measured at both the student and school levels. Similar to the reported findings in Year 1 (McLaughlin et al., 2002), implementation of universal-free school breakfast was associated with higher percentages of school breakfast participation

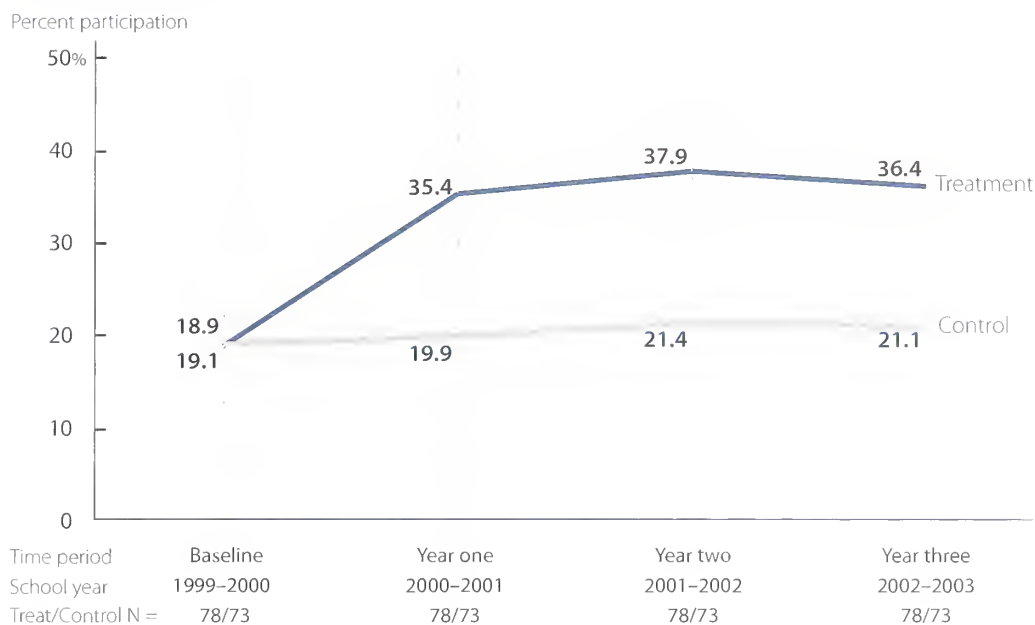
at the school level in Years 2 and 3, relative to the baseline year. Overall, when compared to the baseline year, participation in the treatment schools increased 19 percentage points in Year 2 (from 19 to 38 percent) and 17 percentage points in Year 3 (from 19 to 36 percent). Students in the control schools slightly increased their participation from the baseline year by about 2 percentage points at the end of Years 2 (from 19 to 21 percent) and 3 (from 19 to 21 percent). The overall net gains attributable to the implementation of universal-free school breakfast were thus 17 percentage points from baseline through Year 2 and 15 percentage points through Year 3, which are both statistically significant. Over both of the last two years of the pilot, each school district also showed net increases in treatment school breakfast participation in comparison to the baseline year. The increases ranged from about 11 percentage points by Years 2 and 3 for schools in one district to 30 percentage points by Year 2 for schools in the district where students in treatment schools ate breakfast primarily in the classroom.

The first year of findings also showed significant increases in participation at the student level among sampled students. In Year 1, the overall net gain attributable to the implementation of universal-free school breakfast was 16 percentage points, a statistically significant increase. These gains were maintained over time, with a 21 percentage point net gain over baseline by Year 2 and a 19 percentage point net gain over baseline by Year 3.

However, when looking at both school- and student-level gains over time, we see that participation essentially remained relatively constant for both treatment and control group schools during implementation Years 2 and 3, both overall and at the district level, indicating that participation did not show any further net increases over what was reached during Year 1 (Exhibit 3).

As in Year 1 (McLaughlin et al., 2002), significant differences also emerged in Year 2 when participation was examined by school meal eligibility status (Exhibit 4). Specifically, relative to baseline participation, paid-eligible students in the treatment schools showed a significantly greater jump in participation (25 percentage points) compared to

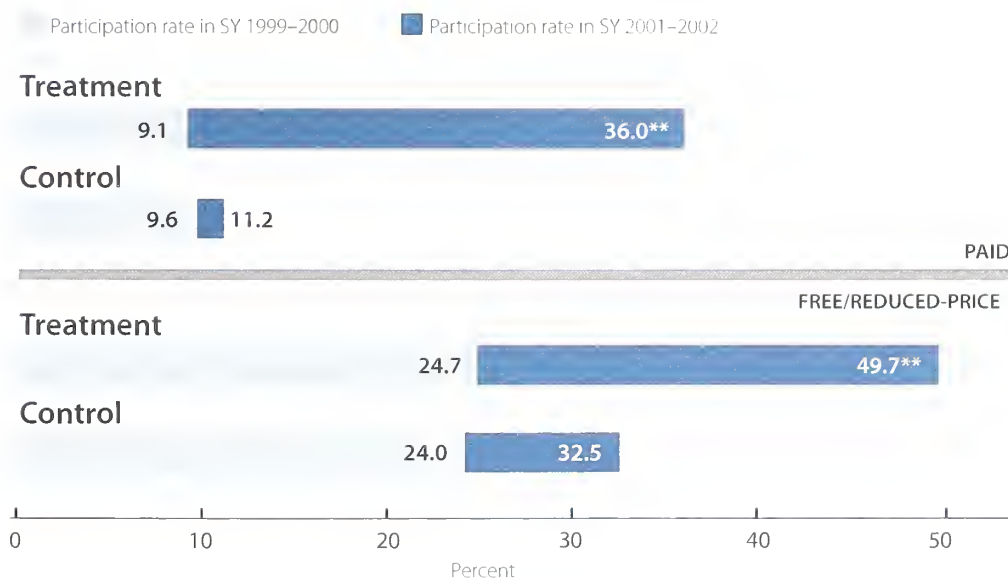
Exhibit 3 Plot of Treatment and Control Group School-Level School Breakfast Participation Over Time



N=151 for all districts, 78 for Treatment and 73 for Control.

Sources: *Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003*

Exhibit 4 Overall Gains in School Breakfast Participation of Sampled Students from SY 1999-2000 to SY 2001-2002, by School Meal Eligibility Status¹



N=2,459

¹ District C could not provide student-level data for this analysis.

** Difference between gains in participation for paid and free/reduced-price students is statistically significant at the .01 level.

Sources: *Impact Study—Student-Level School Breakfast Participation Data, 1999-2000 and 2001-2002*

their control counterparts than free or reduced-price students (15 percentage points).⁸ Differences in participation increases by school meal eligibility status from baseline to Year 3, however, were not statistically significant (a net increase of 21 percentage points for paid-eligible compared with a net increase of 14 percentage points for free or reduced-price eligible).

Student Behavior—Disciplinary Incidents

In the latter two years of the study, the assessment of student behavior was based on the number of disciplinary incidents, recorded as visits by students to the principal's office over the course of a day. Logs of the number of disciplinary incidents were collected from each SBPP school over a 20-week period, divided between Fall and Spring, during both SY 2001–2002 and SY 2002–2003.⁹ The principal's office provided totals of reported incidences by location (classroom, playground, hallway/cafeteria or bus) and whether or not the incident took place in the morning or afternoon. The logs document the disciplinary incidents for all students in the school, and therefore the results are presented as school-level outcomes. The mean number of daily incidents remained low across all schools in Years 2 and 3, indicating that behavioral problems requiring the principal's intervention were relatively rare in these elementary schools. The results for Year 1 indicated a statistically significant negative effect of universal-free school breakfast availability on disciplinary incidents, with treatment schools reporting a significantly higher average number of daily disciplinary incidents than controls (1.13 versus 0.86) (McLaughlin et al., 2002). The differences between treatment and control schools were not statistically significant in the two subsequent years.

When the incidents were broken down by time of day, the overall results indicated a significant impact in the morning in Year 1 (treatment school mean = 0.52, compared to control school mean = 0.39). In Year 2, on the other hand, there was a significant impact on incidents in the afternoon (treatment school mean = 0.58, compared to control school mean = 0.40). In Year 3, there was no effect by time of day.

In an attempt to understand the significantly higher number of disciplinary incidents in the Year 1 impact findings, principals were asked about school disciplinary incidents in the 2003 interviews. Principals' *perceptions* of the incidence of disciplinary actions were lower across both treatment and control schools than the logs of *actual* incidents (e.g., treatment school principals perceived that students had a daily average of 0.3 incidents while the log data indicated 1.2). When comparisons were made of principals' perceptions of disciplinary incidents, the difference between treatment and control schools was not significant, but the difference between principals' perceptions of incidents in classroom and non-classroom treatment schools was significant, with more incidents perceived in schools with classroom breakfast (0.74 compared with 0.32 incidents in non-classroom treatment schools). Substantially more of the principals believed that there were a greater number of disciplinary incidents in the afternoon than in the morning (36 percent versus 3 percent), with no significant difference between control and treatment schools in this regard. In general, principals reported that disciplinary incidents occurred with greatest frequency when students were less closely supervised, such as on the playground or on school buses.

Academic Achievement

Achievement test score gains were measured at both the student and school levels. At the student level, gain scores were measured on the same students as they moved from one grade to the next. For example, scores on students in third grade in 1999–2000 were compared to their fifth grade scores in 2001–2002. Gains at the school level were measured on different cohorts of students at the same grade level, two or three years apart (e.g., third graders in 1999–2000 versus third graders in 2001–2002). Gains in academic achievement test scores were measured by grade level for both reading and math.

Overall, there were no significant differences favoring the treatment schools in either Year 2 or 3 for student-level test scores.¹⁰ There was no clear evidence of positive effects for any of the six school

⁸ Differences reported here and shown in Exhibit 4 are slightly different, as the statistical models used to calculate the impacts are made more precise by including demographic variables (e.g., minority status, school meal eligibility).

⁹ In Year 1 (SY 2000–2001), all logs were collected during a 20-week contiguous period from January through May.

¹⁰ On a measure of second to fourth grade math gain, control group students performed significantly better than treatment group students.

districts. Analyses in which student-level test score results for each grade cohort were combined to form one estimate within each school were also conducted. These analyses, which yielded an average scale score per school, did not show any significant differences between treatment and control school students on either math or reading in Years 2 or 3. Finally, the analyses measuring differences in impacts on test scores among free- or reduced-price versus paid-eligible students did not display a consistent pattern of results either overall or across school districts.

Gains at the school level, on the other hand, showed some significant effects. Specifically, there were significant differences in gain scores favoring the treatment schools on sixth-grade math in Year 3 and second grade reading in Year 2. In addition, there were scattered significant effects at the district level, indicating that treatment effects varied across districts. However, in examining the district-level data, none of the school districts showed any discernible pattern of results. School-level results by grade were also aggregated within school to yield school-level average Normal Curve Equivalent (NCE) scores. On both math (Years 2 and 3) and reading (Year 2), there was significant variation in impacts across districts. These analyses, however, did not show any significant effects at the school district level, with the exception of math in Year 3, where there was an increase of 1.39 in treatment school NCE scores that was significantly different from a decline of -0.26 in control school NCE scores in one of the districts. There were thus a few significant differences among the comparisons made at the school level, but there was no clear pattern of evidence in support of program impacts.

Attendance and Tardiness

Attendance was defined as the number of days present at school divided by the total number of enrolled school days. The mean percentage of days present was compared for both treatment and control students and schools. Tardiness was defined as the number of days the student was late as a percent of the number of enrolled school days. Data on tardiness were not consistently available at the student and school levels and in only two districts were data on tardiness available at both the student and school level.

For both Years 2 and 3, no effects of universal-free school breakfast were found on either attendance or tardiness in any of the main or subgroup analyses conducted. However, rates of attendance were generally high and rates of tardiness were low, thus leaving little room for improvement on these outcomes. The amount of missing tardiness data should also be recognized as a limitation to generalizing from these results.

Student Health—School Nurse Visits

Student health was measured by the number of visits made to the school nurse's office during the course of a day. Logs of school nurse visits were obtained from each SBPP school over a 20-week period, divided between Fall and Spring during both SY 2001–2002 and SY 2002–2003.¹¹ School nurses or health clinic staff provided totals of reported incidents for contagious illnesses, injuries, and minor and acute illnesses, broken down by whether the visit came in the morning or afternoon. Visits to the nurse's office for medications were not included in the counts. It was not possible for schools to provide logs identifying individual students from the study sample. The logs were kept for all students visiting the nurse's office, and the measure is thus a school-level rather than a student-level outcome. The mean number of daily visits was calculated for each district and averaged across all districts. The data were also analyzed by time of day of the nurse visit, as it was expected that school breakfast might have more of an impact on morning than afternoon visits.

The school-level mean for number of daily visits to the nurse's office or health clinic did not differ significantly between treatment and control schools for the first year of the SBPP (McLaughlin et al., 2002). In Year 2, there was a significantly higher average number of daily visits to the school nurse for students in control schools (4.0 compared to 3.3 for students in treatment schools). When analyzed by time of day in Year 2, there were significantly more visits to the school nurse in the morning in control schools (2.2 compared with 1.8 for students in treatment schools). There were no significant differences for Year 3, overall or by time of day.

11 In Year 1 (SY 2000–2001), all logs were collected during a contiguous 20-week period from January through May.

Results of Non-Experimental Analyses

At FNS' request, additional analyses were conducted to address the following questions:

- What is the relationship between breakfast consumption and nutrition and academic outcomes for all students? Specifically, what are the outcomes for those who consume a robust or substantive breakfast and for those who skip breakfast?
- Do students who only eat breakfast at school have different nutrition outcomes than students who only eat breakfast at home or at home *and* school?
- Do treatment group students in schools where school breakfast is eaten in the classroom have different nutrition outcomes than treatment group students in schools where breakfast is eaten in other locations (e.g., cafeteria, hallway) or from control group students in schools where school breakfast is eaten in non-classroom locations?
- Do students from families below 130 percent of the federal poverty level have different nutrition outcomes than students in higher income families?
- Do students who are classified as food insecure differ in their household characteristics from students who are food secure?
- How does school breakfast participation change over the course of the SBPP? Do students with certain demographic characteristics follow a particular participation pattern?

Supplementary analyses were conducted on the Impact Study data collected on the elementary school students in this evaluation. It is important to note that the supplementary analyses were performed outside the experimental framework of the study design. These analyses address questions that are more difficult to address given the original design of this study, and thus the results cannot be interpreted with the same degree of certainty. In particular, because students were not randomly assigned to the two groups of interest (e.g., substantive versus non-substantive breakfast

eaters), differences seen between the two groups may be the result of pre-existing differences and not the variable of interest (e.g., consumption of breakfast). Although we control for student background characteristics wherever possible in these analyses, we cannot assume that groups are statistically comparable, as they are in experimental impact analyses. In a test conducted to assess the presence of selection bias in the supplementary analyses, there was some evidence of selection bias, specifically in the breakfast source and breakfast location analyses. The results should thus be interpreted with caution. Despite these caveats, however, the supplementary analyses may be helpful in further exploring some of the relationships between the groups of interest (e.g., substantive and non-substantive breakfast eaters, breakfast skippers and non-skippers) and student outcomes.

Nutrition Outcomes for Substantive versus Non-Substantive Breakfast Eaters

All measures were based on data collected in parent-assisted 24-hour dietary recall interviews using a standard multiple-pass approach.¹² Breakfast eaters were defined on the basis of the foods and beverages reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that were reported as being part of breakfast on the "target day."¹³ Four definitions of breakfast consumption were adopted for the SBPP:

- Definition 1: Consumption of any food or beverage (except water)
- Definition 2: Consumption of breakfast containing food from at least two of five main food groups¹⁴ and greater than 10 percent of the RDA for food energy
- Definition 3: Consumption of food from at least two of five main food groups and greater than 15 percent of the RDA for food energy

12 The data on intake at breakfast were derived from a dietary recall interview with the student at school. Measures of intake for the full day were based on the combination of data from the breakfast recall with data from a parent-assisted dietary recall interview covering the rest of the 24-hour period.

13 The term "target day" refers to the particular school day the breakfast portion of the dietary recall was conducted with students. About 67 percent of students completed the dietary recall interview with their parents for the target day; another 14 percent completed the recall for a later 24-hour period ("late recall"). The data used in analyses presented here are for the day the child and parent completed the full 24-hour recall, target day or late (n=3,347).

14 The five food groups are (1) milk and milk products, (2) meat and meat equivalents, (3) grain products, (4) fruits and fruit juices, and (5) vegetables and vegetable juices.

- Definition 4: Consumption of food from at least three main food groups and greater than 25 percent of the RDA for food energy—this definition approximates the minimum requirement for food energy (25 percent of the RDA) in reimbursable breakfasts offered through the SBP.

Definition 1 identifies students who consumed *any* breakfast, i.e., they broke the overnight fast with something other than water during the breakfast period. This definition was not used in our analyses of substantive breakfast consumption. Definitions 2, 3, and 4 represent alternative measures of substantive breakfast consumption.

Seventy-eight percent of students were identified as having consumed a substantive breakfast on the target day based on Definition 2; 61 percent based on Definition 3; and 18 percent based on Definition 4. Substantive eaters were more likely than non-substantive eaters to be male and younger, regardless of how substantive breakfast was defined.

Overall, comparisons of the dietary intakes of substantive and non-substantive breakfast eaters resulted in a number of significant differences, with the substantive eaters generally consuming more food energy, nutrients, and Food Guide Pyramid servings at breakfast and over 24 hours than non-substantive eaters. The majority of substantive breakfast eaters (approximately 80 percent) consumed a single substantive breakfast, either from home or at school. Of those substantive breakfast eaters who ate more than one breakfast, almost four fifths consumed their substantive breakfast from school. Of these students, 54 percent ate a non-substantive second breakfast from home, such as a glass of juice or milk, a plain waffle, or a Danish pastry. The remaining 46 percent of students ate two substantive breakfasts, one from school and one from home.

The specific findings for food and nutrient intake at breakfast and over 24 hours are described below.

Food and Nutrient Intake at Breakfast

Substantive breakfast eaters consumed more than twice as much in food energy at breakfast as non-substantive breakfast eaters (24 and 27 percent of the RDA for food energy for Definitions 2 and 3, respectively, compared with 9 and 11 percent for

the non-substantive group). Their breakfasts also included substantially more protein, vitamins, and minerals (as a percent of RDA); more cholesterol, sodium and dietary fiber; and higher levels of total fat, saturated fat, and carbohydrate (as a percent of total food energy). Differences in breakfast intakes for all dietary components measured were statistically significant.

Food and Nutrient Intake over 24 Hours

Substantive breakfast eaters consumed significantly more food energy over a 24-hour period than non-substantive breakfast eaters (104 and 108 percent of the RDA for Definition 2 and 3 substantive eaters versus 90 percent of the RDA for both definitions for the non-substantive breakfast eaters). Similar to the results for breakfast, they also consumed more protein, vitamins, and minerals (as a percent of the RDA), and more cholesterol, sodium and dietary fiber over 24 hours. Differences for 24-hour intakes of total fat and saturated fat (as a percent of total food energy), however, were in the opposite direction (i.e., less for substantive eaters).

Except for food energy, mean intakes of both substantive and non-substantive breakfast eaters met or exceeded the RDA benchmarks for all of the dietary components assessed. Additionally, both substantive and non-substantive breakfast eaters consumed fat, saturated fat, and sodium, on average, in amounts that exceed daily recommendations. Mean 24-hour food energy intake exceeded the RDA for substantive breakfast eaters, based on all three definitions of substantive breakfast.

Definition 2 substantive breakfast eaters consumed significantly more servings of grain products (including whole grains), fruit, and dairy products (primarily milk) over 24 hours compared with non-substantive breakfast eaters. Relative to the recommended number of Food Guide Pyramid servings per day for the age/gender groups of children in the SBPP sample, substantive breakfast eaters were closer to meeting these goals (Kennedy et al., 1995; Bowman et al., 1998). On the other hand, substantive breakfast eaters consumed even more discretionary fat and added sugars over the full day than their non-substantive comparison group—both groups had 24-hour intakes in excess

of recommended maximums for these dietary components.

Breakfast contributed from two to three times as much toward total daily food energy and nutrient intake for substantive eaters as it did for their non-substantive breakfast controls.

Outcomes for Breakfast Skippers versus Breakfast Non-Skippers

Breakfast skippers were defined two ways, using two different data sources, depending on the type of outcome analyzed:

1. For "target day" nutrition and cognitive outcomes (e.g., percent of the RDA for food energy over 24 hours, tests of verbal fluency), children who consumed less than 2.5 percent of the RDA for food energy during the breakfast period were considered breakfast skippers.¹⁵
2. For usual dietary intake, weight status, academic achievement, and other long-term outcomes, children whose parents reported on the Parent Survey that they consumed breakfast 0, 1, or 2 school days a week were considered "usual skippers."

Based on the definitions above, we identified samples of 122 and 177 breakfast skippers for the target day nutrition and cognitive outcomes analyses, respectively; the parent data yielded a maximum sample of 172 usual skippers. Target day skippers represented 3 to 4 percent, and usual breakfast skippers represented 5 percent of the sample overall.

In terms of demographic characteristics, usual breakfast skippers and non-skippers were remarkably similar. The only significant difference was with respect to ethnicity: breakfast skippers were more likely to be non-white compared to non-skippers (46 percent versus 37 percent of students).

Overall, the findings from this analysis suggest that children who skip breakfast consume less total food energy, vitamins, minerals, and other dietary components over a 24-hour period, and are less likely to meet some of their daily nutrient

requirements than non-skippers. Skipping breakfast was not related to cognitive functioning, behavior, risk of overweight or obesity, food security, attendance, or gains in academic achievement.

Food and Nutrient Intake over 24 Hours

Breakfast skippers consumed significantly less food energy (as a percent of the RDA) over a 24-hour period, on average, than breakfast non-skippers (79 percent versus 102 percent). They also consumed significantly less protein, total carbohydrate, vitamins, minerals, cholesterol, sodium, and dietary fiber. However, target day breakfast skippers consumed more total fat and saturated fat as a percent of total food energy.

Breakfast skippers had mean intakes of dietary components that did not meet the RDA benchmarks (for food energy, vitamin A, calcium and magnesium); they also consumed less dietary fiber than the age-plus-5 grams per day recommendation adopted for this study. Non-skippers met the RDA benchmarks and age-plus-5 recommendation.

With regard to Food Guide Pyramid food groups, target day breakfast skippers consumed significantly fewer servings of grain products, fruits, and dairy products (milk in particular) than non-skippers. The differences ranged from an average of one-half to one and a half servings.

Analyses comparing usual breakfast skippers and non-skippers on dietary adequacy found that virtually all students had adequate 24-hour intakes of protein and ten micronutrients. For the three remaining micronutrients assessed—vitamin A, folate, and phosphorous—usual breakfast skippers were significantly less likely to have adequate intakes than non-skippers. Between 20 and 24 percent of breakfast skippers had inadequate usual intakes for these nutrients, compared with 1 to 6 percent of non-skippers. Differences in the likelihood of meeting dietary recommendations for food energy and the macronutrients (fat, carbohydrate, cholesterol, sodium, and dietary fiber) did not reach statistical significance.

¹⁵ The majority of breakfast skippers reported consuming nothing other than water for breakfast. The cutoff of 2.5 percent of the RDA for food energy (45 to 63 calories, depending on age/gender) was chosen after reviewing the foods and amounts reported eaten at the lowest end of distribution for food energy. It approximates the level of intake that distinguishes children who ate only a bite or sip of something (i.e., a nutritionally insignificant breakfast) from those who ate or drank a more substantial serving (e.g., ½ cup juice, ½ granola bar, 1 slice toast, 1 pancake).

Other Student Outcomes

A series of analyses was conducted contrasting usual breakfast skippers with non-skippers on school breakfast participation, attendance, tardiness, classroom behavior, general health, cognitive and social-emotional functioning, weight status, and food security. In terms of school breakfast participation, students who usually skipped breakfast had smaller gains in school breakfast participation than those who ate breakfast regularly. The two groups of students were similar across the other outcomes, with the exception of a benchmark measure used to assess overweight and underweight, called body mass index (BMI). Breakfast skippers had significantly higher BMI percentiles than non-skippers (68th percentile versus 63rd percentile), although they were not more likely to be at risk of overweight or obesity.

Outcomes by Source of Breakfast: Home versus School

Analyses were performed with the SBPP sample to compare nutrition outcomes between children who ate breakfast exclusively from home *versus* exclusively from school. In addition, the analyses included a third group of students—those who ate breakfast from home *and* school on the same day. The results show that the three groups differed significantly with regard to almost all of the nutrients and dietary components assessed. Differences in food group intake were notable mainly between students who consumed breakfast from both home and school and either or both of the other groups of students.

Consumption of a Substantive Breakfast

Students who ate breakfast exclusively from school were significantly more likely to consume a Definition 2 (but not Definition 3) substantive breakfast than students who had breakfast only from home (85 percent versus 75 percent had a Definition 2 breakfast). The great majority of students eating breakfast from both home and school consumed a Definition 2 or Definition 3 substantive breakfast (97 and 91 percent, respectively). As expected, these students were significantly more likely to consume a substantive breakfast than students eating breakfast from either source alone (home or school).

Food and Nutrient Intake at Breakfast

While those who ate breakfast at school were more likely to meet the food component-based criterion for Definition 2 (at least two foods from the five main food groups), their mean food energy and nutrient intake at breakfast tended to be lower than for students who ate exclusively from home (or from both home and school).

Differences in intake at breakfast of Food Guide Pyramid food groups were statistically significant across the three groups for grain and dairy products, fruit, and discretionary fat and added sugars. Except for fruits, students who ate breakfast exclusively from home ate more servings from these Food Guide Pyramid groups than those who had breakfast only from school, but the differences were relatively small (less than one-half serving, on average).

Consistent with findings for food energy and nutrients, students who ate breakfast from both home and school consumed about one additional serving of grains, and one-half serving more of fruits and dairy than other students; they also had the highest breakfast intakes of discretionary fat and added sugars.

Food and Nutrient Intake over 24 Hours

Findings for 24-hour intakes of food energy and nutrients by source of breakfast tended to mirror the differences observed at breakfast. Students who ate breakfast exclusively from home consumed slightly but significantly more food energy and more of most vitamins and minerals (as a percent of the RDA) over 24 hours than those who ate breakfast exclusively from school. They also consumed slightly more saturated fat (as a percent of food energy) and cholesterol. Despite these differences, both groups had mean intakes of food energy, protein, vitamins and minerals that approximated or exceeded the RDA standard. Neither group, however, met the *Dietary Guidelines* recommendations for total fat or saturated fat intake, nor the National Research Council recommended maximum for daily sodium intake of 2,400 mg per day.

Total fat as a percent of food energy was significantly lower among students eating breakfast from both home and school than either source alone. Students who consumed breakfast from both home and school consumed significantly more food energy

(110 percent of the RDA) and most other dietary components than students eating breakfast from only one source.

Analyses of food group intake over 24 hours found that students who ate breakfast exclusively from home consumed significantly more servings of grain products (whole grains), some types of fruits, and milk, as well as higher amounts of discretionary fat and added sugars than students eating breakfast only from school. Students who ate breakfast from both home and school had higher 24-hour intakes of the grain, fruit, and dairy Food Guide Pyramid groups than those with only one source of breakfast. Of note is the finding that 24-hour discretionary fat and added sugar intakes did not differ significantly between students who ate breakfast only from home compared with both home and school.

The analysis of the percent contribution of breakfast to intake over 24 hours shows that, in general, breakfasts exclusively from home are somewhat more important to total daily intake of food energy, macronutrients, and some vitamins and minerals than breakfasts exclusively from school.

Nutrition Outcomes by Availability of Breakfast at School

For this analysis, all students in the sample were categorized as having:

- Universal-free school breakfast available in the classroom (treatment classroom, 18 schools);
- Universal-free school breakfast available in the cafeteria (treatment non-classroom, 61 schools); or
- Universal-free/classroom school breakfast not available (control non-classroom, 73 schools).

The outcomes assessed include measures of breakfast consumption and dietary intake on a given day and usual dietary intake. It is important to recognize that comparisons were based on the *availability* of school breakfast in the student's school, not on their consumption of breakfast in the classroom or the cafeteria.¹⁶ The controllable policy variable of interest is whether breakfast is offered in a particular location—not whether a child eats breakfast in a location.

Results suggest that differences in breakfast consumption patterns were significant, with those eating breakfast in the classroom more likely to consume a substantive breakfast and more than one breakfast, but students' food and nutrient intakes were not clearly related to the location of breakfast availability at school. It should be noted that on tests for selection bias conducted for these supplementary analyses, evidence was found for bias in this set of analyses. Therefore, these results are likely to be due not only to breakfast location, but also pre-existing differences in the classroom and non-classroom breakfast schools.

Breakfast Consumption

Students in treatment schools with classroom breakfast were significantly more likely to eat a substantive breakfast (both Definition 2 and Definition 3) on a given day than students in non-classroom control schools. They were also more likely to eat a Definition 3 breakfast than their counterparts in treatment non-classroom schools.

With respect to the consumption of more than one breakfast, a larger share of students in schools with classroom breakfast ate two or more breakfasts (substantive or not) than either group with non-classroom breakfast.

Food and Nutrient Intake over 24 Hours

No relationship was found between the location of school breakfast and students' 24-hour intake of food energy or macronutrients (e.g., protein, fat, cholesterol, sodium). Students in treatment schools with classroom breakfast consumed significantly less of most vitamins and minerals (relative to the RDA) than students in either non-classroom group. The implications of this result are unclear, however, since 24-hour intakes for both groups exceeded 100 percent of the RDA by a wide margin.

Usual 24-Hour Dietary Intake

No significant differences were observed across the three groups in the percent of students whose usual 24-hour intake met standards for nutrient adequacy (for food energy, protein, and

¹⁶ Non-classroom school breakfast settings were primarily the school cafeterias, although in a small share of schools students were served or ate breakfast in multi-purpose rooms, gymnasiums, kitchens, and even hallways.

vitamins and minerals). Similarly, there was no statistically significant relationship between the location of breakfast at school and the proportion of students whose usual intake met other dietary recommendations (e.g., *Dietary Guidelines* goals for total fat and saturated fat).

Nutrition Outcomes by Household Income

A series of analyses was conducted to compare nutrition outcomes across children with household incomes that would place them in one of the three school-meal eligibility groups:

1. Less than 130 percent of poverty: students who would be classified as eligible for free meals;
2. Between 130 and 185 percent of poverty: students who would be classified as eligible for reduced-price meals; or
3. Above 185 percent of poverty: students who would be classified as eligible for paid meals.

The type of school breakfast available or consumed (universal-free versus regular SBP) was not considered in these analyses. Results suggest that household income is not strongly associated with breakfast consumption, dietary intake on a given day, or meeting standards for dietary adequacy or other recommendations based on usual intake.

Breakfast Consumption

The percentage of students who ate any breakfast or a substantive breakfast (Definition 2 or 3) on the target day did not vary by income group/school meal eligibility status. The results show that a significantly larger share of students in either of the two lower income groups ate more than one (non-substantive) breakfast than those with household incomes above 185 percent of poverty. There was little difference in the percent of students eating two or more *substantive* breakfasts between the three income groups.

Food and Nutrient Intake at Breakfast

Comparisons of food energy and nutrient intakes at breakfast showed that food energy intake did not differ between the three income groups. Differences were significant for only some of the dietary

components measured, including vitamin A, iron, zinc, cholesterol, and sodium. Students' breakfast intakes of Food Guide Pyramid food groups were similar regardless of household income.

Food and Nutrient Intake over 24 Hours

Virtually no differences in 24-hour food energy or nutrient intake were observed. With regard to Food Guide Pyramid food groups, students with household incomes below 130 percent of poverty consumed slightly but significantly fewer servings of whole grains and added sugars than those with incomes above 185 percent of poverty.

Usual 24-Hour Dietary Intake

No significant differences were observed across the three income groups in the percent of students whose usual 24-hour dietary intake met standards for nutrient adequacy or other dietary recommendations (e.g., *Dietary Guidelines* goals for total fat and saturated fat).

Household Characteristics of Food Secure and Food Insecure Households

As reported in the first year findings (McLaughlin et al., 2002), neither the availability of nor participation in universal-free school breakfast had an impact on household food security. Because of the importance of the issue and the opportunity provided by this sample of elementary school students, additional analyses on the food security measure were conducted. Specifically, analyses were run to examine the relationship between household food security and student and family characteristics.

The Household Food Security Scale used in this study is a continuous, linear scale that measures the degree of severity of food insecurity in a household in terms of a single numerical value. The 18 items on the scale have a 12-month reference period. The scale of food insecurity is expressed by numerical values from 0 to 10, and describes the stages of food insecurity from "food secure" (score of 0) to "food insecure with hunger" at its most severe (score of 10).

Except for household size, the results suggest a fairly linear relationship between food security status and the household characteristics included in the analysis. In general, the higher the level of food insecurity, the more likely it is that a student is eligible for free or reduced-price school meals, is in a minority group, is overweight or at risk for overweight, and lives in a single-parent household. In addition, the higher the level of food insecurity, the less likely a student is to be in a household with an income greater than \$70,000 per year or two incomes, or have a parent with a college degree or above.

Participation Patterns and Their Relationship to Student Demographic Characteristics

Participation in universal-free school breakfast was considered a key outcome measure in terms of determining impacts on students and schools. It was thus of interest to determine if there were particular patterns of school breakfast participation over the course of the SBPP, and whether or not there were students with certain demographic characteristics who followed a particular participation pattern.

Across the entire sample of treatment school students with four data points ($n = 853$), two patterns occurred most frequently. One third of the students (33 percent) stayed at roughly the same level of participation that they had at baseline (i.e., increasing or decreasing participation by less than 20 percent). Eighteen percent increased participation between baseline and Year 1 by over 20 percent, and maintained this increased participation level for Years 2 and 3.

Our analyses found little relationship between participation and demographic characteristics. Minority status and eligibility for free and reduced-price meals were related to participation at baseline, but these demographic factors were not related to the amount of change from baseline to Year 1, Year 1 to Year 2, or Year 2 to Year 3.

Growth curve analyses conducted to determine if there were differential rates of change in school breakfast participation based on demographic

characteristics found no significant differences for gender, minority status, and school meal eligibility status. Thus, participation did not change at different rates for these variables (e.g., males had the same rates of change in participation as females for each of the years assessed). Only differences due to age (grades 1 and 2 versus grades 3 or above) were statistically significant, mainly due to changes in participation among younger students (grades 1 and 2) from baseline to Year 1. These students had the lowest level of school breakfast participation at baseline and the biggest jump to Year 1. The analyses of the change from Year 1 to Year 2 and from Year 2 to Year 3 for these younger students, however, did not reveal any further significant change. Thus, this set of demographic variables did not seem to predict change in school breakfast participation from year to year, except in the case of the younger students at baseline.

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